Federal Democratic Republic of Ethiopia

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ET 597 (2001) (English): Bottled drinking water -- Specifications

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Bottled drinking water — Specifications

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Descriptors: bottled drinking water physical, chemical and bacteriological requirements, treatment, testing, packing, labelling.

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Foreword

This Ethiopian Standard has been prepared under the direction of the Environment and Health Protection. Safety and Hygienic Practices Technical Committee and published by the Quality and Standards Authority of Ethiopia (QSAE).

In preparing this standard reference has been made to the following:

- Guidelines for drinking-water quality second edition, 1993, volume 1, recommendations, published by the World Health Organization (WHO), Geneva.

- International Bottled Water Association (IBWA) Regulations, 2001.

- SABS 1657: 1996, *Bottled drinking water - Specification,* published by the South African Bureau of Standards.

- SLS 894:1990, *Specification for bottled drinking water*, published by the Srilankan Standard

Acknowledgement is made for the use of information from the above publications.

Bottled drinking water — Specifications

1 Scope

This Ethiopian Standard specifies the description, treatment, testing, packing and Labelling of water of subterranean origin and bottled preferably at source, intended for human consumption. The water may be offered as bottled non-carbonated ("still") natural water or as bottled carbonated "sparkling" natural water.

It excludes mineral waters, natural or fortified, which is covered by ES 621, and un-bottled drinking water, which is covered by ES 261.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Ethiopian Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Ethiopian Standard are encouraged to investigate the possibility of applying the most recent editions of the Ethiopian Standards indicated below. Registers of currently valid standards are maintained in the Quality and Standards Authority of Ethiopia.

ES 261:2001, *Drinking Water – Specification*

ES 605:2001*, Water quality – Determination of odour and taste*

ES 606:2001*, Water quality – Determination of barium by atomic absorption spectrometry.*

ES 607:2001, *Water quality – Determination of total hardness.*

ES 608:2001*, Water quality – Determination of total organic matter consumed (as O_2)*

ES 609:2001*, Water quality – Determination of total solids and dissolved solids.*

ES 611:2001*, Mineral water – Sampling*.

ES 621:2001, *Mineral waters – Specification.*

FDES OIML R 87, *Net content in packages*[1).]

ES ISO 4833:2001, *Microbiology – General guidance for the enumeration of micro –organisms – colony count technique at 30°c.*

ES ISO 5666-3:2001, *Water quality – Determination of total mercury by flameless atomic absorption spectrometry – Method after digestion with bromine.*

ES ISO 5667-1:2001, *Water quality – sampling- Part 1: Guidance on the design of sampling programs.*

ES ISO 5667-2:2001, *Water quality – Sampling – Part 2:Guidance on sampling techniques.*

[1)] *Under preparation.*

ES ISO 5667-3:2001, *Water quality – Sampling –Part 3: Guidance of the preservation and handling of samples.*

ES ISO 5667-11, *Water quality – Sampling – Part 11: Guidance on sampling of ground water*.

ES ISO 5961:2001*, Water quality – Determination of cadmium by atomic absorption spectrometer.*

ES ISO 6107:2001, *Water quality – vocabulary*

ES ISO 6332:2001, *Water quality – Determination of iron spectrometric method using 1,10-phenanthroline.*

ES ISO 6333:2001, *Water quality – Determination of manganese Formaldoxime spectrometric method*.

ES ISO 6468:2001, *Water quality – Determination of certain organochlorine insecticides, polychlorinated biphenyls and chlorobenzenes – Gas chromatographic method after liquid – liquid extraction*.

ES ISO 6595:2001, *Water quality – Determination of total arsenic – Silver diethyl dithiocarbonate spectrophotometric method*.

ES ISO 6703-1:2001, *Water quality – Determination of cyanide – Part 1: Determination of total cyanide.*

ES ISO 6777:2001*, Water quality-Determination of nitrite-molecular absorption spectrometric method.*

ES ISO 7027:2001, *Water quality – Determination of turbidity.*

ES ISO 7150-2:2001 *Water quality – Determination of ammonium – Part 2: Automated spectrometric method.*

ES ISO 7393:2001, *Water quality – Determination of free chlorine and total chlorine.*

ES ISO 7887:2001*, Water quality – Examination and determination of colour*.

ES ISO 7890-3:2001, *Water quality – Determination of nitrate - Part 3:Spectrometric method using sulfosalicylic acid.*

ES ISO 7899-1:2001, *Water quality – Detection and enumeration of intestinal enterococci in surface and waste water – Part 1:*
Miniaturized method (most probable Number) by in osculation in liquid medium

ES ISO 7899-2:2001, *Water quality – Detection and enumeration of fecal streptococci –part 2: method by membrane filtration.*

ES ISO 7980:2001, *Water quality – Determination of calcium and magnesium – Atomic absorption spectrometric method.*

ES ISO 8165-1:2001, *Water quality – Determination of selected monovalent phenols – Part 1:Gas chromatographic method after enrichment by extraction*.

ES ISO 8288:2001, *Water quality – Determination of cobalt, nickel, copper, zinc, cadmium and lead – Flame atomic absorption spectrometric method.*

ES ISO 9280:2001, *Water quality – Determination of sulfate – Gravimetric method*.

ES ISO 9297:2001, *Water quality – Determination of chloride – Silver nitrate titration with chromate indicator (Mohr's method).*

ES ISO 9308-1:2001, *Water quality – Determination and enumeration of coliform organisms, thermotolerant coliform organisms and presumptive Escherichia Coli – Part 1:Membrance filtration method.*

ES ISO 9308-2:2001, *Water quality – Determination and enumeration of coliform organisms, thermotolerant coliform organisms and presumptive Escherichia Coli – Part 2:Multiple tube (most probable number) method*.

ES ISO 9390:2001, *Water quality – Determination of borate – Spectrometric method using azomethine –H.*

ES ISO 9696:2001, *Water quality – Measurement of gross alpha activity in non-saline water – Thick source method.*

ES ISO 9697:2001, *Water quality – Measurement of gross beta activity in non-saline water.*

ES ISO 9963-1:2001, *Water quality – Determination of alkalinity part 1:Determination of total and composite alkalinity*.

ES ISO 9964-1:2001, *Water quality – Determination of sodium and potassium - Part 1:Determination of sodium by absorption spectrometry.*

ES ISO 9964-2:2001, Water quality – *Determination of sodium and potassium – part 2: Determination of potassium by atomic absorption spectroscopy.*

ES ISO 9965:2001, *Water quality – Determination of selenium – Atomic absorption spectrometric method (hydride technique).*

ES ISO 10301:2001, *Water quality – Determination of volatile halogenated hydrocarbons – Gas – chromatographic method.*

ES ISO 10359-1:2001, *Water quality – Determination of fluoride – Part 1: Electrochemical probe method for potable and lightly polluted water.*

ES ISO 10523:2001, *Water quality – Determination of pH*.

ES ISO 11083:2001, *Water quality – Determination of chromium (vi) – Spectrometric method using 1,5-diphenylcarbazide.*

ES ISO 12020:2001, *Water quality – Determination of aluminium – Atomic absorption spectrometric method*.

3 Definitions

For the purpose of this standard, the following definitions and terms defined in ES ISO 6107 shall apply.

3.1
batch
the quantity of bottled natural water that is processed during a specified period of production in a single bottling plant

3.2
bottle
a container that is made of glass, a plastics material, or tin plate or other suitable material, and that (in each case) is capable of being sealed with a closure

3.3
bottle cycle
the period of bottling that produces a batch

3.4
bottled drinking water
bottled drinking water that is intended for human consumption and that is sealed in bottles with no added ingredients except that it may optionally contain safe and suitable antimicrobial agents (see clause 5.1.1)

3.5
carbonated "sparkling" natural water
a natural water that, after possible treatment in accordance with clause 5.1.1, has been made effervescent by the addition of carbondioxide (see clause 5.3.2)

3.6
defective
a bottle or its contents that does not comply in one or more respects with the relevant requirements of this standard

3.7
lot
product of the same description and from the same batch, in bottles of the same size and type, from the same manufacturer, and submitted at any one time for inspection and testing

3.8
natural
pertaining to the product covered by this standard, descriptive of water that has not undergone any treatment not permitted by this standard

3.9
non-carbonated ("still") natural water
a natural water that, by nature, and after possible treatment in accordance with clause 5.1.1, does not contain free carbondioxide in excess of the amount necessary to keep dissolved the hydrogen carbonate salts that are present in the water

3.10
product
the natural water during processing or in its finally processed state, as indicated by the context

3.11
source
the point at which the product (see clause D.1) is extracted from subterranean water-bearing strata

3.12
spring water
water derived from a subterranean source from which water flows naturally to the surface of the earth (as opposed to being pumped to the surface).

4 Requirements for the factory, employees, and for the extraction area

All the statutory requirements of the Occupational, Health and Safety, and of the Health, settled by the concerned bodies shall comply with (see also Annex B).

5 Requirements for the product

5.1 Permissible treatment, composition and quality factors

5.1.1 Treatments permitted include:

a) separation from unstable constituents by decantation or by filtration (or by both), accelerated, if necessary, by previous aeration;

b) prefiltration, using a coarse filter, and filtration, using a filter of 0.45 μm or less;

c) ultraviolet light treatment;

d) ozonization; and

e) the removal of carbondioxide from the water, and the addition of carbondioxide to the water; either direct, or after an initial removal stage.

The treatments provided for in(a) to(e) above may only be carried out on condition that the mineral content of the product is not modified in the essential constituents which give the product its properties.

NOTE 1- Filtration has the following advantages over chlorination:

i) chlorination alone is not reliable for the treatment of contaminated or turbid water.

ii) chlorine sometimes causes objectionable tastes or odours in water.

NOTE 2 - Water disinfection by bactericidal irradiation (ultraviolet rays) has the following advantages over chlorination:

i) the natural organoloptic properties of water are not changed

ii) the bactericidal effect of radiation occurs much more quickly than in chlorination

iii) kill not only vegetative species of bacteria, but also spore-forming ones

iv) plants for water disinfection by bactericidal radiation are easier in operation than chlorination.

NOTE 3 - An advantage of ozonization consists in that:

i) ozone not only disinfects water, but also decolorizes it, eliminates flavours and odours and, ingeneral, improves the organoleptic properties

ii) ozone has no effect on the natural properties of water, since its excessive (non-reacted ozone) changes to oxygen in a few minutes.

NOTE 4 - Aeration is used to add oxygen to water and to remove carbondioxide, hydrogen sulfide, and taste- producing gases or vapors.

NOTE 5 - Care should be taken in the selection of an ultraviolet light source, to ensure that the light source is effective in killing the bacteria. If the bacteria are only damaged, the water might initially test sterile, but the damage bacteria might, after a period, repair their cell structure.

5.1.2 The product shall not be transported in bulk containers for bottling or for any other purpose before bottling.

5.1.3 The source shall be connected direct to the bottling plant by means of a suitable pipeline (see annex B.2) that will not contaminate the product or change the composition of the product. The distance from the source to the bottling plant should not exceed 1km. If the distance exceeds 1km, the regulatory body shall be satisfied that the product would not be adversely affected.

5.1.4 The product shall not be subjected to any treatment other than the treatments permitted by this standard.

5.2 Physical, chemical and microbiological requirements

5.2.1 Physical requirements

The physical characteristics of bottled drinking water shall conform to the levels specified in Table 1 and the frequency of testing shall be on daily basis.

Table 1 – Physical requirement of bottled drinking water

Characteristics	Maximum permissible level	Test method
Odour and Taste	unobjectionable	ES 605
Turbidity, NTU Max	5	ES ISO 7027
Colour, TCU, Max	15	ES ISO 7887

5.2.2 Chemical requirements

5.2.2.1 Palatability properties

Characteristics that affect the palatability of bottled drinking water shall conform to the levels specified in Table 2 and frequency of testing shall be initially and quarterly except for pH which shall be tested daily.

Table 2 – Characteristics that affect the palatability of bottled drinking water

Substance or characteristic	Maximum permissible level	Test method
Total hardness (as $CaCO_3$) mg/l	300	ES 607
Total dissolved solids mg/l, Max	1000	ES 609
Total Iron (as Fe), mg/l, Max	0.3	ES ISO 6332
Manganese (as Mn) mg/l, Max	0.5	ES ISO 6333
Ammonia (NH_3+NH_4^+)* mg/l, Max	1.5	ES ISO 7100-2
Magnesium (as Mg) mg/l, Max	50	ES ISO 7980
Calcium (as Ca), mg/l, Max	75	ES ISO 7980
Copper (as Cu), mg/l, Max	1	ES ISO 8288
Zinc (as Zn), mg/l, Max	5	ES ISO 8288
Sulfate (as SO_4), mg/l, Max	250	ES ISO 9280
Chloride (as Cl), mg/l, Max	250	ES ISO 9297
Total alkalinity (as $caco_3$) mg/l, Max	200	ES ISO 9963-1
Sodium (as Na), mg/l, Max	200	ES ISO 9964-1
pH value	6.0 to 8.5	ES ISO 10523
Potassium (as K), mg/l, Max	50	ES ISO 9964-2
Aluminium (as Al), mg/l, Max	0.2	ES ISO 12020

*The term ammonia includes the non-ionized (NH_3) and ionized ($NH^+{}_4$) species.

5.2.2.2 Content of toxic and/or disease causing substances when tested, the characteristics that affects the safety of bottled drinking water shall conform to the levels specified in Table 3.

Table 3 – Content of toxic and/or disease causing substances of bottled drinking water

Substance or characteristic	Maximum permissible level	Test method
Barium (as Ba) mg/l, Max	0.7	ES 606
Organic matter (as O_2) mg/l, Max	3	ES 608
Total mercury (as Hg) mg/l, Max	0.001	ES ISO 5666-3
Cadmium (as ES ISO) mg/l, Max	0.003	ES ISO 5961
Arsenic (as As) mg/l, Max	0.01	ES ISO 6595
Cyanide (as CN) mg/l, Max	0.07	ES ISO 6703-1
Nitrite (as NO_2) mg/l, Max	3	ES ISO 6777
Nitrate(asNO_3)mg/l, Max	50	ES ISO 7890-3
Phenolic compound as phenols , mg/l, Max.	0.002	ES ISO 8165-1
Lead (as Pb) mg/l, Max	0.01	ES ISO 8288
Boron mg/l, Max	0.3	ES ISO 9390
Selenium (as Se) mg/l, Max	0.01	ES ISO 9965
Fluoride (as F) Max	1.5	ES ISO 10359-1

Table 3 - continued

Chromium (as Cr) mg/l, Max	0.05	ES ISO 11083
Pesticides and organic constituents, µg/l, Max		
a) DDT	2	ES ISO 6468
b) Heptachlor and heptachlorepoxide	0.03	
c) Hexachlorobenzene	1	
d) Lindane (Gamma -BHC)	2	
e) Methoxychlor	20	
f) Aldrin /Dieldrine	0.03	
g) 1,2 – dichloro ethane	30	ES ISO 10301
h) 1,1,1 – Trichloro ethane	2001	
i) Trichloro ethene	70	
j) Trichlorobenzenes (total)	1	
k) Hexachlorobutadiene	0.6	

NOTE 6 - Several of the inorganic elements for which maximum permissible levels has been settled are recognized to be essential elements in human nutrition. No attempt has been made here to define a minimum desirable concentration of such substances in drinking water.

NOTE 7 - Because of the possibility of simultaneous occurrence of nitrite and nitrate in bottled drinking water, the sum of the ratios of the concentration of each to its standard value should not exceed 1, i.e. $\frac{C_{nitrite}}{SV_{nitrite}} + \frac{C_{nitrate}}{SV_{nitrate}} \leq 1$, where C is concentration and SV is standard value.

NOTE 8 – The limit value for fluoride should consider climatic conditions; volume of water consumed and intake from other sources provided the limit specified in the above table is satisfied.

5.2.3 Bacteriological requirements

Bacteriological requirements of bottled drinking water shall conform to the levels specified in Table 4 and frequency of testing shall be daily.

Table 4 – Bacteriological levels

Organism	Maximum permissible level	Test method
Coliform organisms, number per 100 ml	undetectable	ES ISO 9308-1 or, ES ISO 9308-2
E. Coli, number per 100 ml	undetectable	ES ISO 9308-1 or, ES ISO 9308-2
Total viable organisms, colonies per 100 ml	undetectable	ES ISO 4833
Faecal streptococci per 100 ml	undetectable	ES ISO 7899-1 or ES ISO 7899-2

5.2.4 Radioactivity if present shall not exceed the following levels, when tested according to ES ISO 9696 and ES ISO 9697 respectively:

a) gross alpha activity 0.1Bq/l max, and

b) gross beta activity 1 Bq/l max

NOTE 9 - If a screening value is exceeded, more detailed radio nuclide analysis is necessary. Higher values do not necessarily imply that the water is unsuitable for human consumption.

5.2.5 Source protection, source monitoring, all required physical, chemical and microbiological analysis of the product shall be maintained on file at the plant and shall be available for official review up on request of the applicable state agency.

5.3 General requirements

5.3.1 Freedom from defects

The product shall comply with the test for turbidity under normal conditions of storage. Dust, fiber particles, surface film or scum, sediment and other foreign matter shall not be present.

5.3.2 Carbonation

If carbonated, the bottled natural water shall be carbonated in accordance with the claimed product type stipulated on the label.

The carbondioxide used (other than carbondioxide from the source) shall have a purity of at least 97.5%. All carbondioxide shall be free from hydrogen sulfide, sulfurdioxide and other noxious gases, and from foreign odour.

5.3.3. Shelf life

The composition and preparation of the product shall ensure a shelf life of at least 3 months under the storage conditions recommended by the manufacturer.

6 Sampling

Samples shall be taken from the source and bottled product in accordance with Annex A(see also ES ISO 5667-11)

7 Packaging

The product shall be packed in sealed retail containers of 2 liters max capacity that will not contaminate or adulterate the product. In addition, the bottles shall not impart foreign flavours or foreign odours to the product. The material used in the bottles shall be food grade1) (see also annex C)

8 Labelling

Applied labels on bottles shall be clean, neat and securely attached. They shall not be super imposed on other labels or on printed matter printed direct on the bottles. They shall not be applied by any person other than the manufacturer or his authorized agent.

8.1 The name of the product

The name of the product shall be a true description of the product concerned.

8.2 Specific composition

The composition of the product shall be declared in advertising and on the label, the concentration, in units of mg/l, (unless specified) of the following constituents being included in the declaration and listed in the following order:

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1) Under preparation.

Calcium as ....as Ca

Magnesium.....................as Mg

Sodium...........................as Na

Potassium ....as K

Chloride..........................as Cl

Sulfate ....as SO_4

Total alkalinity..................as $CaCO_3$

Nitrate..............................as NO_3

Fluoride ....as F

Iron ....as Fe

Bicarbonate as $CaCO_3$

Total dissolved solids P^H value

8.3 Carbonation

The label shall state whether the product is natural ("still) or carbonated ("sparkling") natural, or slightly carbonated as a means of preservation.

8.4 Fitness for infants

In the case where the product has a sodium content exceeding 100mg/l, or sulfate content exceeding 200 mg/l, or a nitrate (as N) content exceeding 6mg/l, or any combination of these, a statement shall be made to the effect that the product is not suitable for the preparation of food for infants.

8.5 Net content

The net contents shall be declared by volume in the metric system (SI units) and shall comply with the requirements of FDES OIML R 87.

8.6 Name and address

The location of the source, the name of the source, name and physical address of the exploiter shall be declared.

8.7 Lot identification

Each bottle shall be embossed or otherwise permanently marked, in code or otherwise, to identify the producing factory, the lot, date of manufacture, the expiry date. The use of a code is permissible only if the key to the code is disclosed to the Quality and Standards Authority of Ethiopia.

8.8 Additional labelling requirements

If a bottled natural water has been submitted to a treatment in accordance with clause 5.1.1, the treatment shall be declared on the label.

8.9 Optional labelling

a) the term "Bottled in Ethiopia" may appear on the label only if the product is from Ethiopian source and has been bottled in accordance with the requirements of this standard.

b) a trade name; and

c) the following terms, descriptive of the particular properties of the product, may appear on the label as part of or in close proximately to, the name of the product or in an otherwise prominent position, provided that the conditions specified are adhered to:

i) "acidulous" - where the product contains more than 250mg/l of free carbondioxide;

ii) "saline" - where the product contains more than 250 mg/l of NaCl

iii) 'contains fluorine" - where the product contains more than 1.5 mg/l F;

iv) "contains iron" - where the product contains more than 0.3 mg/l of Fe; and

v) 'contains iodine" - where the product contains more than 1mg/l I.

8.10 labelling prohibition

8.10.1 No claims concerning medicinal (preventive, alleviative or curative) or other beneficial effects relating to the health of the consumer shall be made in respect of the properties of the product covered by this standard.

8.10.2 The name of a locality, village or specified place may not form part of the trade name unless it refers to product collected at the place designated by that trade name.

8.10.3 The use of any statement or of any pictorial device which might create confusion in the mind of the public or in any way mislead the public about the nature, origin, composition and properties of the product put on sale is prohibited.

9 Storage and transportation of the end-product

The end – product should be stored and transported under such conditions as will preclude contamination with and/or proliferation of micro-organisms and protect against deterioration of the product or damage to the container. During storage, periodic inspection of the end – product should take place to ensure that only bottled drinking water which is fit for human consumption is dispatched and that end. Product specifications should be complied with when they exist.

10 Designation

In making orders and in technical and commercial document, bottled drinking water (BDW) shall be designated as BDW/ES 597.

Annex A
(Normative)

Sampling and compliance with the standard

The following sampling procedure shall be applied to determine whether a lot, submitted for inspection and test, complies with deemed to represent the lot.

A.1. General requirements of sampling

A.1.1 Each bottle of the sample shall be marked with necessary details of sampling and the bottles for bacteriological testing shall be marked separately.

A.1.2 The bottles of the sample shall be stored in such a manner that there shall be no deterioration of quality of water.

A.1.3 The bottles for bacteriological testing shall be brought to the testing laboratory with in 1h of sampling. If this is not possible the bottles shall be stored at 10^{o}c or below and transported to the testing laboratory within 24h.

A.2 Scale of sampling

A.2.1 Samples shall be tested from each lot for ascertaining its conformity to the requirements of this standard.

A.2.2 From the lot, take at random the number of bottles, shown in Table A.1.

Table A.1- Scale of sampling

Number of bottles in the lot	Number of bottles to be selected
Up to 1,000	15
1001 to 3000	17
3001 to 10 000	18
10 001 and above	24

A.2.3 If the bottles are packed in cases, 10% of the cases subject to a minimum of 5 cases shall be selected from the lot and as far as possible an equal number of bottles shall be selected from each case so select, to form a sample size given in A.2.2

A.3 Number of tests

A.3.1 Each bottle selected as in A.2.2 or A.2.3 shall be inspected for packaging and labelling requirements.

A.3.2 Ten bottles shall be selected from the bottles selected as in A.2.2 or A.2.3 and tested individually for bacteriological limits.

A.3.3 A sufficient quantity of water shall be drawn from each of the remaining bottles and mixed to form a composite sample and the composite sample thus obtained shall be tested for physical and chemical requirements.

A.4 Criteria for conformity

A lot shall be declared as conforming to the requirements of this standard if the following conditions are satisfied.

A.4.1 Each bottle inspected in A.3.1 satisfies the packing and labelling requirements.

A.4.2 Each bottle when tested as in A.3.2 satisfies the bacteriological requirements.

A.4.3 The composite sample when tested as in A.3.3. satisfies the physical and chemical requirements.

Annex B
(Informative)

Requirements for the factory, for employees, and for the extraction area

B.1 Requirements for the factory and for employees

B.1.1 General

All the statutory requirements of the occupational health and safety of the health, shall be complied with.

The factory, the equipment and the water used in the preparation of the product shall comply with the requirements given in B.1.2 to B.3 inclusive.

B.1.2 Factory construction, layout and conditions

B.1.2.1 Location, size, hygienic design and conditions

The location of the premises and the construction of the factory buildings shall be such that the premises and the buildings can be kept acceptably free from objectionable odours, smoke, dust and other contamination in order to comply with the relevant requirements for hygiene and sanitation. Adequate working space shall be provided to allow for satisfactory performance of all operations. The buildings and facilities shall be designed to provide:

a) separation by effective means between operations that could cause cross-contamination; and

b) a regular flow in the processing, from the arrival of the product at the premises to the finished product.

Provision shall be made for appropriate temperature conditions for the process and for the product.

The factory buildings shall be of sound construction, in good repair and large enough to prevent crowding of equipment and employees, to permit adequate cleaning and the maintenance of hygiene and product quality and to allow proper supervision of operations. The factory grounds shall be graded to ensure proper drainage. The factory and grounds shall be maintained in a clean and hygienic state and shall be effectively fenced. Roadways and areas that serve the factory and that are within its boundaries or in its immediate vicinity, shall have hard, paved surfaces suitable for wheeled traffic.

A system of control that does not contaminate the product shall be maintained to keep the factory free from birds, rodents, insects and other vermin.

B.1.2.2 Roofs, ceilings and overhead fittings

The roof shall be weatherproof. The roof and ceilings shall be at least 300 mm above any overhead equipment and in no case less than 3 m from the floor. Ceilings and, where no ceilings are fitted, roofs shall be faced with a smooth impervious material that is light in colour and capable of being easily cleaned without damage, and shall be so designed, constructed and finished as to be dustproof and to minimize condensation, mould development, flaking paint and the lodgment of dirt. A ceiling shall be provided where the packaging materials or unprotected product are handled. A ceiling is not required where a canopy corers the entire open product. In processing areas, all overhead structures and fittings shall be installed in such a way as to avoid direct or indirect contamination of product or raw materials by falling dust, dirt, condensation and drip, and shall not hamper cleaning operations. They should be insulated where appropriate.

B.1.2.3 Walls and doors

Outer walls shall be weatherproof and impermeable to water. Interior wall surfaces shall be faced with a smooth, crevice-free, impact-resistant, impervious, light-coloured, non-toxic material to a height of not less than 2 m from the floor. Where splashing might occur above this height, the facing shall be continued to this higher level. Above 2m, the walls shall have a smooth, crevice-free, impervious, washable, light-coloured surface. All ledges that occur in the wall construction shall be sloped at an angle of at least 45^0. The walls shall be free from unnecessary projections.

Wall-to-wall and wall-to-floor junctions in bottling areas shall be coved. The minimum radius of the coving shall be 25 mm and 40 mm respectively.

Doors shall be of adequate width and tight-fitting. Doors and door frames shall be sheathed with, or made from, corrosion-resistant material that has high-impact resistance and, unless provided with effective air screens, shall, as far as is practicable, be of a self-closing type. Doors and door frames shall have a smooth, seamless, impervious, light-coloured, readily cleanable surface.

B.1.2.4 Windows

Window-sills (sloped at an angle of at least 45^0) shall be at least 1 m above floor level.

Windows and other openings shall be so constructed as to avoid accumulation of dirt.

Windows that open shall be fitted with screens that are easily removable for cleaning, and shall be kept in good repair.

B.1.2.5 Floors of processing areas

Floors shall be constructed of concrete or other suitable smooth, impervious, non-slip and non-toxic material that is resistant to wear and corrosion, easy to clean and laid to an even surface that is free from cracks, crevices and open joints. Floors and drainage channels shall be graded to have a fall of at least 1 in 60 and shall be drained to internal drainage channels that are connected to external sewers via a suitable drain trap.

Floors and drainage channels shall be in good condition and repair and shall have strainers in place.

Internal drainage channels shall be of the open type with, where necessary, removable covers.

Where necessary, duckboards of easily cleaned impervious material shall be provided for workers.

Installations that obstruct flow and cleaning shall not be present in drainage channels. The capacity of drainage channels shall be sufficient to cope with peak loads. The factory shall have an efficient effluent and waste disposal system, so designed and constructed that it cannot contaminate or be detrimental to the product or the source of product.

B.1.2.6 Lift cages and staircases

Lift cages shall have a smooth, impervious, corrosion-resistant inside surface and lift shafts shall be properly drained and shall be accessible for cleaning. Staircases in rooms where the product is processed or handled shall have solid risers, and shall be provided with solid balustrades to a height that prevents contamination of the product underneath. Stairs, lift cages and auxiliary structures such as platforms, ladders, chutes and catwalks shall be so constructed and situated as not to cause contamination of the product. Where necessary, chutes shall be constructed with inspection and cleaning hatches.

B.1.2.7 Pipes, cables, reservoirs and storage tanks

Piping for product lines shall be independent of piping for water used for other purposes and of piping for non-potable water. Product water and water for steam production or for refrigeration or for any other use, shall be carried in completely separate lines, with no cross-connection between them and without back-siphonage. Piping for the product shall be distinguished by colour from other water pipelines. In the pipeline for the product, there shall be no opening between the point of collection and the filling point. Cables and pipes shall be either:

a) fixed above ceilings; or

b) chased into walls; or

c) fixed to walls in such a way that the walls, cables and pipes can be easily cleaned and maintained in a hygienic condition; or

d) carried under floors.

Overhead pipes and cable connections to machines that cannot be fixed above the ceiling shall be carried a minimum of 40 mm apart on tubular brackets suspended at least 40 mm away from the ceiling.

Waste and other pipes that cannot be chased into walls, shall be fixed a minimum of 40 mm from the wall surfaces and 150 mm above the floor and spaced a minimum of 40 mm apart.

Pipes in which the product is conveyed shall have no dead ends.

Reservoirs and storage tanks shall be constructed from materials suitable for the product. Reservoirs and storage tanks shall be fitted with tight-fitting covers, manholes or hatches. Only water pipelines that carry the product may be connected to the reservoirs and storage tanks used for the product. Such reservoirs and storage tanks shall be distinctively marked.

B.1.2.8 Illumination

General illumination shall be such as to permit efficient operations during the manufacture, production, processing or treatment of the product. Artificial illumination, if used, shall be such that the colour of the product is not significantly altered. Light bulbs and fixtures suspended over the product at any stage of preparation, processing or packaging shall be of the safety type or shall be otherwise protected to prevent contamination of the product in the event of breakage.

B.1.2.9 Ventilation

The ventilation shall keep the air fresh, prevent excessive heat, remove excess steam or vapour, and prevent the formation of condensate and growth of mould. Natural ventilation shall be augmented, if necessary, by mechanical means. Air flow shall be from the more hygienic to the less hygienic to the less hygienic areas of the factory. The air shall be free of noxious fumes, vapour, dust and contaminating aerosols.

B.1.2.10 Hand-washing facilities

The following shall be provided at the entrances to the preparation and processing areas of the factory used by the employees and at other convenient places in the preparation and processing areas of the factory within easy reach of the employees, and near the water closets in such a position that employees have to pass them when returning to the processing area:

a) an adequate number of wash-hand basins, with an abundant supply of hot and cold running water (from taps operated by means other than hands or elbows) or warm water in the temperature range 40^0C to 50^0C; and

b) abundant unscented liquid soap or suitable detergent, and disposable towels.

Access to hand-washing facilities shall at all times be unobstructed by equipment and operating activities.

B.1.2.11 Processing areas

Processing areas shall be so designed and equipped as to allow adequate working space, and so staffed as to allow free movement of workers and to facilitate the free movement and cleaning of movable equipment.

Walls and floors shall have a smooth finish and shall be impervious to moisture, and measures shall be taken to prevent the flaking off of surface material from ceilings and walls, Brick walls shall be plastered. Processing areas shall be kept reasonably free from surplus water.

The filling (bottling) area shall be separate from the storage areas.

The cleaning and washing area for re-used bottles shall be separate from the filling (bottling) area.

B.1.2.12 Storage facilities for packaging materials

Containers, closures, cartons and labels for the packing and packaging of the product shall be stored in clean, dustproof, dry storerooms that are reserved for the purpose and are separate from production areas and other storage areas.

B.1.2.13 Storage facilities for pesticides, poisons and other hazardous materials

Pesticides, poisons and other hazardous materials and the equipment for their application, shall be stored in a room separate from the processing area and the storage areas for ingredients or containers. The room shall be kept locked.

B.1.2.14 Storage facilities for cleaning and disinfecting materials

Cleaning and disinfecting materials and equipment shall be stored in a room separate from the processing area and shall at no time come into contact with containers, raw materials or the product.

B.1.2.15 Storage facilities for the product

Product awaiting dispatch shall be stacked, but not direct upon the floor, in well-ventilated, clean and dry rooms. The finished product shall be stored under conditions that will prevent contamination, microbiological spoilage and deterioration. Adequate measures shall be taken to protect the product against rough handling and damage. The product shall not be exposed to direct sunlight or to temperatures above 30^0C.

Product found not to comply with the in-house or other quality management systems or with the requirements of this standard should be stacked apart from that which complies with the requirements.

B.1.2.16 Refuse

A separate refuse room or other equally adequate refuse facility shall be provided on the premises and shall be cleaned daily (see B.4.4.). The design and construction of the refuse facility shall be such as to prevent the harbouring of pests and the contamination of the product, equipment or building.

B.1.2.17 Comfort facilities

Adequate dining-rooms, rest rooms, change-rooms, shower baths, wash-hand basins, and water closets (separate for each sex) shall be provided. Comfort facilities shall be separated from and shall not open direct onto, processing areas.

Water closets shall be provided at an acceptable distance from the processing areas and shall be completely separate from change-rooms, the only permissible access being close-fitting self-closing doors. The toilets shall be so designed and constructed as to ensure hygienic removal of wastes. An abundant supply of toilet paper shall be provided at the toilet facilities. Hot and cold running water (from taps operated by means other than the hands or elbows), unscented liquid soap, nail brushes and paper towels (not hot air driers) shall be available to employees at the facilities. Receptacles shall be provided for used disposable towels at each hand-washing facility. These receptacles shall be provided for used disposable towels at each hand-washing facility. These receptacles shall be regularly emptied and cleaned. The comfort facilities shall be kept neat and clean. Lockers shall be provided and the layout and equipment shall be such as to permit proper cleaning and maintenance. Alternatively, a system of controlled clothes baskets may be used instead of lockers.

There shall be adequate ventilation and illumination. The requirements of the Occupational Health and Safety Act, 1993, shall be complied with. Separate facilities shall be available for "clean" and "dirty" workers. When food is consumed on the premises by employees during rest periods, a room or rooms that have adequate dining facilities shall be provided. The change-rooms shall not be used for the preparation of food or as living quarters. Comfort facilities shall not be used as storage areas.

B.1.2.18 Facilities for cleaning and disinfecting portable equipment

A separate room or a partitioned-off area shall be equipped for the washing and disinfecting of work implements and of loose items of equipment, such as trays, trollies, etc. Hot and cold water under adequate pressure shall be provided. If a separate room is not provided, the area to be used shall be such that there will be no possibility of contamination of the product. The floor of the room or area shall be smooth-surfaced and graded, to facilitate the disposal of waste liquids from the cleaning process.

B.1.2.19 Notices

Notices prohibiting eating, spitting and the use of chewing gum and tobacco in any form shall be posted in each processing area and in each area for the storage of ingredients (see B.5.3). Notices requesting employees to wash their hands on entering the processing areas and after using the toilets shall be posted at each entrance used by employees to gain access to the processing areas, and at exits from the toilet complex.

B.2 Equipment

B.2.1 General

Equipment, implements and utensils shall be suitable for their intended use. All plant (including pipe work, vessels, valves, taps, monitoring devices or probes), equipment, implements and utensils that come into contact with the product shall be made of a smooth-surfaced, corrosion-resistant and non-absorbent material, free from pits or crevices, that does not transmit toxic substances, foreign odours or flavours to the product, does not stain or soil the product or change the original qualities of the product, and is preferably stainless steel. Acceptable alternatives to stainless steel are polyethyulene and unplasticized polyvinyl chloride (UPVC). The use of different materials in such a way that contact corrosion can occur shall be avoided. The equipment, implements and utensils shall be capable of withstanding repeated cleaning and disinfection. They shall be of hygienic design and so installed as to prevent hygiene hazards and to permit easy and effective cleaning and disinfection. Where necessary, as in the case of equipment that cannot be cleaned in situ, it shall be possible to dismantle equipment for cleaning and disinfection. Equipment, implements or utensils shall not be removed from the processing areas, except for repairs or for cleaning.

Equipment shall not be sunk into the floor unless provision is made for adequate drainage. All parts of stationary or not readily movable equipment shall be installed at such distances away from the walls and ceiling as are sufficient to provide access for cleaning and inspection. All permanently mounted equipment shall either be installed sufficiently above the floor to provide access for cleaning and inspection, or be completely sealed to the floor.

Lead and lead alloys, other than solder, and other metals that could after the character of the product, shall not be used in the construction of equipment that comes into contact with the unprotected product at any stage of processing.

B.2.2 Tables

Table frames shall be made of smooth, corrosion-resistant metal, free from pits or crevices, or shall be treated against corrosion, and the tops shall be made of stainless steel or other corrosion-resistant, smooth, impervious material that has similar surface characteristics.

The tabletops shall be constructed in such a way as to be accessible for effective cleaning. Where metal tops are folded at the edge, the fold shall be effectively soldered or welded or sealed with an acceptable mastic sealant in such a way as to prevent the product from entering the folded section. The tops of tables shall allow rapid and effective drainage and shall be free from cracks and crevices. All joints shall be made watertight.

B.2.3 Cleaning and disinfection facilities

Cleaning and disinfecting materials, hot and cold running water that complies with B.3, hosepipes, brushes and other materials necessary for the cleaning of the plant and utensils shall be available.

B.3 Water (other than the product)

Facilities for the storage, treatment and distribution of water shall be adequately protected against contamination. The factory shall use a supply of clean potable water under adequate pressure and free from suspended matter and substances that are deleterious to the product or injurious to health.

Potable water shall comply with the requirements of ES 596.

B.4 Hygienic operating requirements

B.4.1 General

In the factory and on its grounds, no operation that is detrimental to the manufacture, processing or treatment of the product shall be permitted.

Effective measures shall be taken to inhibit mould growth and to prevent dust, dirt, flaking paint and other loose or extraneous material from being present in the processing areas or in the storage rooms.

The factory and grounds shall be maintained in a clean and hygienic state.

All plant equipment and utensils shall be maintained in a state of good repair and shall be cleaned as frequently as is necessary and disinfected whenever required y circumstances. Provision shall be made for the cleaning-in-place (CIP) of pipes and tanks used for the product. The entire processing or treatment system, including utensils, shall be cleaned at each change of operations. At the end of operations, filling nozzles and other parts exposed to bacterial contamination shall be thoroughly cleaned, rinsed and disinfected, and the rest of the system shall be cleaned and rinsed. Whenever necessary, but at least weekly, the entire system shall be cleaned, rinsed and disinfected. Immediately before the start of processing operation, plant and utensils shall be rinsed with potable water that complies with B.3. Steam used in the cleaning of surfaces that come into contact with the product shall not contain substances that could contaminate the product.

B.4.2 Floors and drainage channels

During processing periods, the floor and the drainage channel shall be kept clean. Thorough cleaning of floors and drainage channels shall take place at the end of each day's operations and as often as is necessary during the working day to maintain hygienic conditions.

B.4.3 Walls

The inside surfaces of walls be thoroughly washed immediately after each day's operations and as often as is necessary during the working day to maintain hygienic conditions.

B.4.4 Removal of refuse

Litter, waste and overflow shall not be allowed to accumulate or give rise to unhygienic conditions and shall be disposed of in an efficient and hygienic way.

B.4.5 Vermin and pest control

All refuse facilities (see B.1.2.16) and all buildings in which packaging materials are stored or in which the product is processed or stored shall be rodent proof and kept free of pests.

B.4.6 The use of pesticides

Pesticides shall not be used while processing is in operation. Equipment, utensils and work surfaces shall be kept free from pesticide residues.

Pesticides shall at no time come into contact with containers or the product.

Pesticides shall only be dispensed and handled by authorized and properly trained personnel, or by persons under strict supervision of trained personnel.

B.4.7 Animals

Animals, including birds, shall not be allowed in any part of the factory.

B.5 Requirements for employees engaged in the processing of the product

B.5.1 Health

B.5.1.1 Before being engaged, employees shall pass a medical examination and shall thereafter undergo an annual medical examination.

B.5.1.2 The management shall ensure that no person who is suffering from, or who is a carrier of, any communicable disease (especially a carrier of Salmonella or Shigella organisms), or who shows symptoms of, or is suffering from, gastroenteritis or an enterobacterial infection or is suffering from any condition causing discharge of pus or serum or loose skin from any part of the body shall be allowed to engage in the preparation, processing, handling or transportation of the product, or to work in any part of the factory where the product is prepared, processed, handled or transported.

B.5.1.3 The management shall ensure that no person who is known or suspected to be affected with a disease that can be transmitted through food, or who is known or suspected to be a carrier of such disease, or who is known or suspected to be afflicted with infected wounds, sores or any illness, is permitted to work in any part of the factory in a capacity in which there is a likelihood of that person's contaminating the product with pathogenic organisms.

B.5.1.4 All medical certificates submitted by an employee of a factory shall be available for inspection by the authority administering this standard.

B.5.1.5 The management shall ensure that no person who is suffering from any cut or injury is engaged in the factory in the preparation, processing, handling or transportation of the product unless and until the cut or injury has been so treated or dressed that the discharge of body fluids onto the product has been prevented, and the wound and its dressing have been so covered as to ensure that infection or contamination of the product is no longer possible. The dressing and its covering shall be conspicuous in colour.

B.5.2 Protective clothing

All employees engaged in the preparation and processing of the product, and also other factory workers and visitors who might enter the preparation and processing areas, shall wear clean protective clothing and clean, washable caps or acceptable alternative headgear to cover their hair. Employees engaged in the processing of the product shall wear light-coloured protective clothing. Waterproof protective clothing shall be made of a plastics material or rubber, or a similar acceptable material. Overalls shall cover the personal clothing of the employees. Sleeves shall not extend below the elbows except when acceptably covered by plastics sleevelets. All protective clothing shall be of acceptable hygienic design, shall have no top pockets, shall be in good repair, and shall not constitute a source of contamination of the product.

Waterproof protective clothing shall be cleaned at each time of removal and hung on hooks or pegs at exits from preparation and processing areas during intervals between work and during visits to toilets. Overalls shall be left in the cloakrooms when their wearers leave the factory building during breaks. Protective footwear shall be worn in preparation and processing areas.

Spitting and the use of chewing gum or tobacco in any form shall be prohibited within the preparation, processing, packing and storage areas of the factory. (See also B.1.2.19.)

B.5.3 Personal hygiene

Employees shall keep their fingernails short and clean, and shall wash their hands with unscented liquid soap and water before commencing work, after each absence from the factory processing area, at regular intervals during the day and when they have been contaminated. Varnish or lacquer shall not be used on fingernails. Jewellery and wristwatches shall not be present in the preparation, processing, packing and storage areas of the factory.

Spitting and the use of chewing gum or tobacco in any form shall be prohibited within the preparation, processing, packing and storage areas of the factory. (See also B.1.2.19.)

B.6 Requirements for the extraction area, and for extraction of the product

B.6.1 Requirements for the extraction area

B.6.1.1 Protection of the extraction area from contamination

In the immediate surroundings of springs, wells or boreholes, precautionary measures shall be taken to ensure that no pollutants can enter the extraction area. The extraction area shall be completely enclosed and rendered inaccessible to animals and unauthorized persons that could damage the extraction equipment or contaminate the source. Any activities other than the collection of the product or servicing of the installation shall be prohibited in this area.

The installations for collection, such as the pipes, pumps, equipment and reservoirs that come into contact with the product, shall be made from materials suited to the product (see B.2.1), shall be constructed in such a way as to prevent the introduction of foreign substances into the product, and shall not change the original qualities of the product.

Canalization and drainage and used-water lines and also any possible waste storage area within the protected perimeter shall be built and maintained in such a way as not to present any risk whatsoever of polluting springs, boreholes, wells or aquifers.

Any storage area or tank for the storage of fuels such as coal or hydrocarbons shall be designed, protected, controlled and maintained in such a way as to prevent springs, boreholes, wells or aquifers from being polluted during the storage and manipulation of these fuels.

B.6.1.2 Maintenance of extraction and storage facilities

Methods and procedures for maintaining the extraction facilities shall be hygienic and not conducive to contamination or pollution of the product.

The equipment and reservoirs used for extraction of the product shall be so constructed and maintained as to minimize all hazards to human health and to avoid contamination of the product and alteration of the original quality of the product. The quantity of product stored shall not exceed the demand for one day's production, and shall not be stored for longer than 48 h. However, a pH neutral product shall not be stored for longer than 24 h.

If, during production, it is found that the product is contaminated (polluted), all operations shall be stopped until the cause of the contamination is determined and eliminated.

B.6.2 Requirements for extraction of the product

Product shall be extracted in conformity with the hydrogeological conditions in such a way as to prevent any extraneous water or pollutants from entering the extraction system.

Annex C
(normative)

Bottles

C.1 Type of bottles

The product shall be packed in suitable bottles that will not contaminate or adulterate the product. The bottles shall be delivered to the bottling plant in sealed containers.

C.2 Condition of bottles

At the time of filling all bottles shall be clean and sound. Closures shall be clean at the time of capping or sealing, and shall be fitted internally with a solid cork or composition cork disc or with an acceptable plastics disc. The bottles used for the product shall have its own separate store and shall not be used by workers for drinking purpose.

C.3 Washing of bottles

All returnable bottles (and, where necessary, new bottles) used for the product shall be cleaned by a suitable automatic process immediately before being filled. The process shall include:

a) a pre-soak or pre-rinse;

b) brushing, soaking, or jetting with an efficient cleaning solution for a sufficient time at a temperature high enough to ensure through cleaning; and

c) thorough rinsing with potable water to remove all traces of the cleaning solution from the bottles (see annex B:3)

C.4 Filling and sealing of bottles

Bottles shall be filled under strictly hygienic conditions by means of manual or automatic equipment maintained in a hygienic state. The open ends of bottles shall not be touched by hand. Immediately after filling, the bottles shall be sealed. Closing machines shall be kept clean and contamination of the product from soiled equipment or detached particles of material shall be avoided.

C.5 Inspection of bottles

Inspection of washed, unfilled and filled bottles shall be performed on a continuous basis, either by means of electronic equipment maintained in perfect working order, or by means of personnel who operate as slighter. The slighter shall be relieved at intervals not exceeding 30 min, and the eyes of each slighter shall be tested at least every 12 months.

Annex D
(normative)

Requirement for the source and for the untreated product

D.1 Requirements for the source

The producer shall provide the Quality and Standards Authority of Ethiopia with a certificate from the concerned body. The certificate shall:

a) certify that the source is not in danger of pollution by any agency such as (but not limited to) sewerage, farming operations, waste disposal or industrial activities or any combination of these;

b) give the hydrogeology of the source, including a detailed geological description of the surroundings terrain;

c) give a description of the equipment for water extraction;

d) give the rate of natural flow of the spring, and its seasonal variations, or the maximum discharge rate of the source.

e) Should the testing of the untreated product (D.2) subsequently show evidence of contamination or pollution, a concerned body shall be commissioned to survey the area surrounding the source, to determine the case of the contamination or pollution, and production shall cease until such case is eliminated.

D.2 Requirements for the untreated product

D.2.1 The untreated product shall be tested for the constituents listed in Table 1, 2 and 3, at the frequency stated.

D.2.2 The untreated product shall comply with the requirements of clause 5.2.3 when determined with the respective test methods.

D.2.3 Micro-biological tests shall be carried out within 24 h of sampling, the samples having been kept at 4°C ± 1°C for the period prior to testing. When the product is tested using the following method, parasites shall be absent in 10l of the untreated product.

Use a 0.45 m millipore filter under vacuum, to filter 10l. of the product. Examine the filter at 400 times magnification under a phase contrast microscope for the presence of parasites.

NOTE - As algae can be confused with certain protozoan cysts such as cryptosperidium and Giaradia, it is advisable to use an immunofluorescent stain and a fluorescing microscope to distinguish between these organisms.

D.2.4 If the initial or subsequent surveys (see D.1), or both indicate the possibility of contamination of the source, the untreated product shall be tested for the contaminants, such as phenolic compounds, organochlorine pesticides, cyanide and nitrite, and shall comply the requirements of this standard.

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Quality and Standards Authority of Ethiopia

ORGANIZATION AND SERVICES OFFERED

The Quality and Standards Authority of Ethiopia (QSAE) is the national standards body of Ethiopia established in 1970.

It has undergone several restructuring programs since its establishment, and currently provides a comprehensive range of services in the following areas:

- Ethiopian Standards development;
- Regulation enforcement (Compulsory product certification and legal metrology);
- Laboratory testing in the fields of mechanical, electrical, chemical and biological testing;
- Calibration of instruments in various measurement areas;
- Product inspection;
- Training on standardization, quality, testing and metrology; and
- Provision of up-to-date standards information.

QSAE operates a national product certification scheme whereby manufacturers licensed under the scheme have the right to use the Quality Mark shown in the figure below.

ETHIOPIAN STANDARDS

Technical committees made up of experts from industry, trade, government, and other user groups prepare Ethiopian Standards. The requirements or recommendations contained in Ethiopian Standards are a consensus of the views of representative interests and also take account of comments received from the general public and other sources. Ethiopian Standards are kept under continuous review after publication and are updated regularly to take account of latest scientific and technological changes.

Orders for all Ethiopian Standards, and international and foreign national standards, including electronic versions, should be addressed to the Documentation and Technical Information Group at the Head Office. A Catalogue of Ethiopian Standards is also available at our Head Office, Branches and Representative Offices.

INTERNATIONAL INVOLVEMENT

QSAE, representing Ethiopia, is a member of the International Organization for Standardization (ISO), International Organization of Legal Metrology (OIML) and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the International Electro-technical Commission (IEC). It is a founding member of the African Regional Organization for Standardization (ARSO).

MORE INFORMATION?

Contact us at the following address.

The Head Office of QSAE is at Addis Ababa with seven Branches and three Representative Offices elsewhere in the country and at Djibouti ready to cater for all your quality and standards needs.

Wereda 17, Kebele 21, Addis Ababa.

P.O. Box: 2310, Addis Ababa, Ethiopia

Telephone: (251-1) 62 69 75/62 69 76

Fax: (251-1) 46 08 80

E-mail: qsae@telecom.net.et, *Web Site:* www.qsae.org

Quality Mark